

Legionellosis (*Legionella pneumophila*)

(Also known as Legionnaires' Disease and Pontiac Fever)

March 2004 HighPoint

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Legionellosis is an infection caused by the *Legionella* species, with *Legionella pneumophila* being the most common. Numerous serogroups are commonly recognized, although *L. pneumophila* serogroup 1 is most commonly associated with serious illness.

B. Clinical Description and Laboratory Diagnosis

Legionellosis has two distinct forms: Legionnaires' disease, which is the more severe form of the infection, and Pontiac fever which is milder. The most common initial symptoms for Legionnaires' disease and Pontiac fever are anorexia, myalgia, malaise and headache. This is rapidly followed by fever (up to 102–105° F), chills and a non-productive cough. Other symptoms may include abdominal pain and diarrhea. Legionnaires' disease is associated with pneumonia. The case-fatality ratio overall is 5–30%. Pontiac fever is not associated with pneumonia or death, and cases usually recover in 2 to 5 days without treatment. Legionnaires' disease usually cannot be distinguished from other forms of pneumonia and requires certain tests to confirm the diagnosis. The illness most often affects older persons, especially those who smoke cigarettes or have chronic lung disease. Other risk factors include immunosuppressive therapy and immunosuppressive diseases, such as AIDS and diabetes.

Laboratory confirmation is based on isolation of *Legionella* sp. from clinical specimens (lung tissue, respiratory secretion, pleural fluid, blood or other sterile site); demonstration of *L. pneumophila* serogroup 1 in lung tissue, respiratory secretions, or pleural fluid by direct fluorescent antibody testing, fourfold or greater rise in serum immunofluorescent antibody titer to *L. pneumophila* serogroup 1 to 128 or greater; or detection of *L. pneumophila* serogroup 1 antigen in urine.

C. Reservoirs

Legionella is commonly found in the environment. It has been identified in many different kinds of water and water systems, such as hot and cold water taps and showers, creeks, ponds, whirlpool spas, and cooling towers and evaporative condensers of large air-conditioning systems. Outbreaks of legionellosis have been linked to these sources, as well as to decorative fountains, humidifiers, respiratory therapy devices and misters (such as those found in the produce section of grocery stores). These bacteria are most likely to reproduce to high numbers in warm, stagnant water. In this environment, they often live as intracellular parasites of free-living amoebae.

D. Modes of Transmission

Legionellosis is transmitted via the airborne route when aerosols are inhaled from a water source contaminated with the bacteria or through aspiration. Legionellosis is not known to be transmitted from person-to-person. There is no evidence to suggest transmission of *Legionella* from auto air-conditioners or household window air-conditioning units which do not use water as their coolant.

E. Incubation Period

The incubation for Legionnaires' disease is from 2 to 10 days, but most often 5 to 6 days. The incubation for Pontiac fever is from 5 to 66 hours, but most often 24 to 48 hours.

F. Period of Communicability or Infectious Period

Legionellosis is not communicable from person-to-person.

G. Epidemiology

Legionnaires' disease was named after an outbreak that occurred in Philadelphia in 1976, among people attending a convention of the American Legion. Legionellosis has a worldwide distribution with cases reported from North America, Australia, Africa, South America and Europe. An estimated 8,000 to 18,000 people get Legionnaires' disease in the United States each year. Most of these are single, isolated cases not associated with an outbreak. Outbreaks usually occur in the summer and fall, though cases occur year-round. Serologic surveys have shown a prevalence of antibodies to *Legionella pneumophila* serogroup 1 at a titer of $\geq 1:128$ in 1–20% of the population. *Legionella* is estimated to be responsible for between 0.5% and 5% of cases of community-acquired pneumonias. Legionellosis is underdiagnosed and underreported: only 1 to 2 cases are reported each year to NJDHSS.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. New Jersey Department of Health and Senior Services (NJDHSS) Case Definition CASE CLASSIFICATION

A. CONFIRMED

A clinically compatible case, **AND**

- Isolation of *Legionella* species from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluids; **OR**
- Demonstration of a fourfold or greater rise in the reciprocal immunofluorescence antibody (IFA) titer to $\geq 1:128$ against *L. pneumophila* serogroup 1 between acute and convalescent phase serum specimens; **OR**
- Detection of *L. pneumophila* serogroup 1 in respiratory secretions, lung tissue, or pleural fluid by direct fluorescent antibody testing; **OR**
- Demonstration of *L. pneumophila* serogroup 1 antigens in urine by radioimmunoassay or enzyme-linked immunosorbent assay.

B. PROBABLE

Not used.

C. POSSIBLE

Not used.

NOTE Isolates of *L. pneumophila* must be submitted within the three (3) working days to the New Jersey Department of Health and Senior Services, Division of Public Health and Environmental Laboratories, Specimen Receiving and Records, P.O. Box 361, John Fitch Plaza, Trenton, NJ 08625- 0361.

B. Laboratory Testing Services Available

The Public Health and Environmental Laboratories (PHEL) provide services for the isolation of *Legionella* species from lung biopsy, sputum, bronchial washings, pleural fluid and other normally sterile fluids. The PHEL also provides indirect fluorescent antibody (IFA) testing on paired sera. Questions regarding sample submission may be directed to the Special Immunology Laboratory at 609.292.5819.

Environmental specimens will also be accepted with prior authorization from the Division of Epidemiology, Environmental and Occupational Health Services in the case of a suspected positive clinical sample.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify sources of major public health concern (*e.g.*, a contaminated water source) and to stop transmission from such a source.

B. Laboratory and Healthcare Provider Reporting Requirements

The New Jersey Administrative Code (N.J.A.C. 8:57-1.8) stipulates that health care providers and laboratories report (by telephone, confidential fax, over the Internet using Communicable Disease Reporting System [CDRS] or in writing) all cases of legionellosis to the local health officer having jurisdiction over the locality in which the patient lives, or, if unknown, to the health officer in whose jurisdiction the health care provider requesting the laboratory examination is located.

C. Health Officers Reporting and Follow-Up Responsibilities

1. Reporting Requirements

N.J.A.C. 8:57-1.8 stipulates that each local health officer must report the occurrence of any case of legionellosis, as defined by the reporting criteria in Section 2 A above to the NJDHSS Infectious and Zoonotic Diseases Program (IZDP). A report can be filed electronically over the Internet using confidential and secure CDRS.

2. Case Investigation

- a. It is the local health officer's responsibility to complete a CDC [*Legionellosis Case Report*](#) form by interviewing the patient and others who may be able to provide information. Much of the information required on the form can be obtained from the patient's healthcare provider or the medical record.
- b. Use the following guidelines to complete the form:
 - 1) Accurately record the demographic information and occupation.
 - 2) The "Possible Sources of Infection" section asks about the case's exposures during the 2 weeks before illness onset. Ask questions about travel history in order to identify where the patient became infected.
 - 3) Provide information regarding "Underlying Disease at Date of Onset" since legionellosis often affects people who have certain conditions or who smoke cigarettes.
 - 4) Complete the "Clinical Illness" section, providing diagnosis, date of symptom onset, whether hospitalized (and associated dates) and outcome of disease. (One use of this section is to distinguish cases of Legionnaires' disease from Pontiac fever, when possible [*e.g.*, x-ray diagnosed pneumonia indicates Legionnaires' disease]).
 - 5) Collect the information requested in the "Method of Diagnosis" section. This information is important in defining a case. Ask the healthcare provider to submit a copy of the medical record or enlist his/her aid in completing these sections of the case report form.
 - 6) If there have been several attempts to obtain patient information were made (*e.g.*, the patient or healthcare provider does not return calls or respond to a letter, or the patient refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as possible. Please note on the form the reason why it could not be filled out completely. **If CDRS is used to report, enter the collected information into the "Comments" section.**
- c. After completing the form and attaching lab report(s), it should be mailed (in an envelope marked "Confidential") to the NJDHSS IZDP, or the report can be filed electronically over the Internet using the confidential and secure CDRS. The mailing address is:

NJDHSS
Division of Epidemiology, Environmental and Occupational Health
Infectious and Zoonotic Diseases Program
P.O.Box 369
Trenton, NJ 08625-0369

- d. Institution of disease control measures is an integral part of case investigations. It is the local health officer's responsibility to understand, and, if necessary, to institute the control guidelines listed below in Section 4, "Controlling Further Spread."

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (N.J.A.C. 8:57-1.10)

None.

B. Protection of Contacts of a Case

None.

C. Managing Special Situations

Response to a Single Case of Community-Acquired Legionellosis

One case of legionellosis does not require any further investigation other than completing the CDC [Legionellosis Case Report](#) form. See Section 3 C, Case Investigation. Sporadic case-patients typically report that they may have gotten the infection from a particular place such as work or their places of worship or recreation. Since *Legionella* can be found in a wide variety of water sources at low levels, unless another case occurs that also implicates the reported "source," it is difficult to prove a particular source was the cause of illness. Alleged sources should not be tested or decontaminated based on one community-acquired case.

Response to Nosocomially Acquired Legionellosis

A laboratory-confirmed case of legionellosis that occurs in a patient who has been hospitalized continuously for ≥10 days before the onset of illness is considered a case of nosocomial legionellosis. When a case of nosocomial legionellosis occurs in a hospital or long-term care facility, surveillance efforts for additional cases should be enhanced by the infection control official at the facility. **Confirmed cases of nosocomial legionellosis or 2 persons with possible nosocomial legionellosis within 6 months should prompt an epidemiological investigation to identify the source and eliminate the contamination.** See Section 4 D below. Additionally, refer to "[Guidelines for Prevention of Nosocomial Pneumonia](#)" in the January 3, 1997 issue of *MMWR* (46:RR-1) for detailed recommendations for responding to nosocomial legionellosis.

Reported Incidence Is Higher than Usual/Outbreak Suspected

If the number of reported cases in city/town is higher than usual, or if an outbreak is suspected, investigate clustered cases in an area or institution to determine the source of infection. A source of infection could be a cooling tower, decorative fountain, whirlpool spa, grocery store mister, etc. If evidence indicates a common source, applicable preventive or control measures should be instituted. Testing water sources is a specialized procedure and will require the assistance of environmental professionals. A confirmed source should be cleaned and decontaminated according to established protocols and a schedule of continued testing must be put in place for a period of time that will be determined on a case-by-case basis. Consult with the NJDHSS IZDP staff, available at 609.588.7500. The staff can help determine a course of action to prevent further cases and can perform surveillance for cases that may cross several jurisdictions and therefore be difficult to identify at a local level.

D. Preventive Measures

To avoid future exposures:

- Cooling towers should be drained when not in use and mechanically cleaned and maintained according to the manufacturer's recommendations.
- Tap water should not be used in respiratory therapy devices.
- Hotels, cruise ships and other owners of whirlpool spas and decorative fountains should maintain them according to the manufacturer's recommendations and keep current on protocols for public health safety.
- After outbreaks, vigilant monitoring of proven infection sources should be maintained.

ADDITIONAL INFORMATION

A [*Legionellosis Fact Sheet*](#) can be obtained at the NJDHSS website at <http://www.state.nj.us/health>. Click on the “Topics A to Z” link and scroll down to the *Legionellosis*.

The formal CDC surveillance case definition for legionellosis is the same as the criteria outlined in Section 2 A of this chapter. CDC case definitions are used by state departments of health and CDC to maintain uniform standards for national reporting. For reporting to the NJDHSS, always use the criteria outlined in Section 2 A.

REFERENCES

American Academy of Pediatrics. 2000 Red Book: Report of the Committee on Infectious Diseases, 25th Edition. Illinois, Academy of Pediatrics, 2000.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. MMWR. 1997; 46:RR-10.

CDC. Guidelines for Prevention of Nosocomial Pneumonia, MMWR. January 3, 1997; 46:RR-1.

CDC Website. Legionellosis: Legionnaires’ Disease and Pontiac Fever. Available at http://www.cdc.gov/ncidod/dbmd/diseaseinfo/legionellosis_g.htm. Updated January 4, 2000.

CDC Sustained Transmission of Nosocomial Legionnaires Disease – Arizona and Ohio. MMWR. 1997; 46(19):416-421.

Chin, J., ed. Control of Communicable Diseases Manual, 17th Edition. Washington, DC, American Public Health Association, 2000.

Fiore, A.E., et al. Epidemic Legionnaires’ Disease Two Decades Later: Legionellosis Sources, New Diagnostic Methods. Clinical Infectious Diseases. 1998; 26:426–433.

Massachusetts Department of Public Health, Division of Epidemiology and Immunization. Guide to Surveillance and Reporting. Massachusetts Department of Public Health, Division of Epidemiology and Immunization, January 2001.

Stout, JE., and Yu, VL. Current Concepts: Legionellosis. NEJM1997;337: 682-687